UNCINARIASIS: A MEDICAL PROBLEM OF TO-DAY

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UNCINARIASIS or ankylostomiasis, more popularly known as hookworm disease, although especially prevalent in tropical and subtropical climates, has for a number of years been steadily gaining ground in many of the European countries and to a lesser extent in parts of the United States. On the continent it is in a great measure confined to workers in mines, brickyards and tunnels; in fact one of the names by which it is known is "Tunnel disease." In Belgium, in one mine alone, over seventy-five per cent. of the workers were found to be infected with the parasite.

In the tropics it has been estimated that the little worm kills more people annually than yellow fever did in its palmiest days, and in Porto Rico so frequent are fatalities from this source that it is called by the people "*la muerti natural*" or the natural death. In view of the widespread and ever-increasing interest aroused in the medical world and from the fact that commissions have been appointed in various countries for its study and treatment, a few words upon the subject to the kindred profession of nursing may be welcome, more especially to those of us whose fields of labor lie within the infected area.

The definition of uncinariasis given by the commission appointed by the Legislative Assembly of Porto Rico is as follows: "A specific infectious disease of tropical and subtropical climates and of favorable localities in the temperate zone, occurring in individuals who come in contact with damp earth or muddy water containing the larvæ of *uncinaria deodenalis* or *uncinaria americana;* characterized by an insidious progressive anemia, weakness, various nervous and digestive disturbances; generally capable of cure on removal of the parasite and capable of prevention by a proper disposal of human excrement." Although the existence of the disease and the parasite causing it were known to Italian physicians as early as 1843, it did not receive especial notice until the year 1879 when the attention of the medical profession was drawn to the great St. Gothard tunnel epidemic of anemia. Hundreds of workmen sickened and died from causes unknown to medical science.

At length an Italian physician discovered in the intestines of a man from the tunnel who had died of the mysterious disease over fifteen hundred uncinaria. The knowledge thus gained began to be applied in

other directions; to the hitherto unexplained anemia of brick yards, mines, etc., of France, Hungary and other countries, and for the last eight years civilized nations have devoted much study and money to the problem of ridding humanity of the disease and its source of infection. Germany, in particular, has been unceasing in her efforts since the widespread epidemic in the Westphalia mining districts in 1895. Enormous sums of money have been spent, and at the present time success seems to be well within her grasp, although the fight still continues. The United States has recognized the importance of the work by appointing Dr. Charles Wardell Stiles, of the Marine Hospital Service, to determine by investigation the frequency and distribution of uncinariasis in the southern states. Dr. Stiles found that it is prevalent and that such diagnoses as pale skin, heart disease, and malaria cachexia, must undergo a radical change. Our government also afforded substantial aid to the above mentioned Porto Rico commission. To the naked eye, the Uncinaria Americana has the appearance of a thread-like worm from one-fourth to one-half inch in length; under the microscope its distinguishing characteristic is the head, which is bent backwards, giving to the parasite a hook-like appearance from which it familiar name of "hook-worm" is derived. It is usually found in the upper half of the small intestine with the head so firmly buried in the mucous membrane that much force is required to dislodge it.

Until quite recently pathologists have agreed that the worm is a blood sucker, subsisting upon the plasma alone and not upon the corpuscles, but it has been a disputed point whether it is possible for such tiny creatures, even although present in great numbers, to abstract enough blood to cause the intense anemia usually found in infected persons. Loos and Sangalli have lately advanced the theory that the uncinaria draws its sustenance entirely from the intestinal mucosa and not from the blood. Although this is still a doubtful point, there is a general concensus of opinion that the anemia is due largely or entirely to a toxin in some way generated by the infecting parasite. Infection occurs as follows: the ovo *never* hatches in the human body but in the earth after its expulsion in the feces. In the soil, provided that favorable conditions as to temperature, moisture, shade, etc., exist, the ova becomes an encapsulated larva and in this form may enter the body in one of two ways or both: First by mouth, in muddy water, imperfectly washed vegetables, or through any contamination of the food and water supply; second, and by far the more frequent way, is by penetration of the skin. Until recently this mode was considered questionable, but it is now an absolutely accepted fact.

It has been demonstrated within the last few years that soil or water containing the larvæ, when applied to the skin, give rise to an acute dermatitis, sometimes called ground itch or water itch, followed by the formation of vesicles and by swelling. In this way the larvæ penetrate the muscles, but it is not until several weeks later that they reach the intestines and become adult worms. The chief diagnostic sign is the appearance of the ova in the feces (distinguishable only under the microscope), and another of great importance is the extreme anemia usually present, in very severe cases the hemoglobin being as low as eight per cent. Uncinaria may be present in the intestines without any of the usual pathological signs with the exception of ova in the feces. In Great Britain, the United States, our island dependencies, and in parts of South America, thymol is the usual remedy, and in the hospitals on the Isthmus of Panama it is the only drug that I have ever seen employed.

Treatments differ as to dose and mode of administration according to the view of the physician in charge. The following are the standing orders for thymol treatment in the ward at Ancon Hospital where I am at present on duty: "Light supper or liquid diet the night before; calomel, gr. iii, 8 P.M.; mag. sulph, 50 per cent. sol, ℥ i, at five the next morning; no breakfast; stop all other medication; thymol, gr. xx, in capsule, at six, repeat at seven; mag. sulph. sol, ℥i, at eight. The calomel is given, not alone for its purgative effect, but because it sweeps the intestine free of mucus and leaves the worm exposed to the full effect of the vermifuge. At midday, return to usual diet and medication.

The stools, from the first dose of thymol until the last dose of salt, must be saved for examination. In addition to the ova, they nearly always contain dead uncinaria in great numbers. Several treatments, five or six days apart, may be needed to rid the intestines entirely of the unwelcome inhabitants, and they are persisted in until no trace of the parasite can be detected in the feces. Between the treatments, and after their termination, a liberal diet is indicated and also some good blood-making tonic.

On the continent, *Felix Mas* (male fern), is the remedy most in favor, as it is thought by most European physicians to be less dangerous than thymol which, when absorbed, is a powerful depressant, from the use of which collapse and death have been known to result. More recent experiments show conclusively that the chief danger lies in its administration on a full stomach and in an alcohol or oil solution. Thymol is but slightly soluble in water and, when given after the necessary preliminary precautions have been observed, passes from the body

practically unchanged. For this reason, castor oil should never be the cathartic given and alcoholic stimulants by mouth should not be allowed under any circumstances as both render the drug more soluble and easily absorbed. When the hemoglobin reaches 75 per cent. the cure is considered complete. A remedy much employed in India, and coming into use extensively in South America and the West Indies, is beta-naphthol, which has all of the vermifuge properties of thymol at one-tenth the cost.

As already stated, the ova never incubate in the body, and so it is evident that when the original number of worms has been exterminated, the cure is complete, unless the patient is reinfected, and this is the discouraging feature of the treatment of uncinariasis, as such infections are almost unavoidable so long as the ground in certain localities fairly teems with the larvæ of the parasites. The only efficient preventive measures seem to be prompt and vigorous treatment of all infected persons together with a thorough system of sanitation and stringent ordinances against soil pollution by human excreta. Various methods of soil disinfection, for the destruction of the larvæ, have been tried, but thus far results have not been encouraging. Even at best they would be imperfect as the expense would be enormous, and such a concentration of chemicals in the strength required would be extremely dangerous as well. Sanitation seems to be the only solution of the problem.